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FAUNAL STUDIES OF THE REPTILES AND AMPHIBIANS OF SOUTHWESTERN IMPERIAL COUNTY, CALIFORNIA

A Report Prepared for the Bureau of Land Management

by

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INTRODUCTION

A detailed survey of the reptile and amphibian fauna of extreme southwestern Imperial County, California, is of interest for several reasons. The area has previously been largely neglected by scientists even though it is the only area of Imperial County which contacts the eastern flanks of the Sierra Juarez with its extensive slopes of granitic boulders and associated plant and animal communities. Until recently this area was largely inaccessible to all but a small number of people, mostly miners and immigration officers. However, because it is a remote and unusually scenic area, it has suffered increasing use and abuse by off-road-vehicle enthusiasts. Since nearly the entire area in consideration is under the control of the Bureau of Land Management, examination of physical and biological resources in the area is essential to establishment of future management priorities. In addition, the discovery of a unique lizard species unknown to science within the study area prompts further study to determine its status and basic ecology.

The area has been previously overlooked in large part due to the remote location in relation to existing roads and due to the greater interest in adjacent areas of chaparral and desert floor habitats.

OBJECTIVES

Under terms of a contract from the Bureau of Land Management, a study of reptiles and amphibians found in extreme southwestern Imperial County was conducted from 1 March until 1 July 1977. Although fieldwork had been underway in this area for nearly a year previously, the contractual arrangement allowed a more intensive and coordinated research schedule. Two objectives of this study were:

1. To study the reptile fauna of southwestern Imperial County to determine distributions, habitats, and relative abundances.
2. To investigate the biology and relationship of a new lizard previously unknown in the arid regions of the southwestern United States.

MATERIALS AND METHODS

The study area is bounded on the east by the eastern wall of Davies Valley, the west by the San Diego/Imperial County line, the north by Interstate 8 and the south by the U.S./Mexican border.

During the course of this study, 147 pitfall traps were installed and monitored on a weekly basis at eight sites within the study area. Traps consisted of 3-5 gallon containers buried flush with the ground with a flat top shading the container held 5-10 cm above the substrate. Some one gallon pitfalls were used to facilitate placement of traps in extremely rocky areas. Because some reptiles rarely leave rock surfaces, vertical rock faces were sampled with 12 special traps (herein called rock droppers) designed by Douglas W. Ruth. The distribution of trapping sites is summarized in Table 1.

Sampling was also performed by driving along surfaced and unsurfaced roads at night, on foot during daylight and nocturnal hours and by moving debris, rock litter and other objects under which reptiles commonly hide.

Nocturnal work was limited due to the danger posed by drive-through smuggling activity. Federal officers from Border Patrol and U. S. Customs emphatically discouraged work in Davies Valley and Pinto Wash after dark. This danger also limited nocturnal search on foot to secluded canyons and distant areas.

Fieldwork was also hampered by flood damage to the jeep trail into Smuggler's Cove from In-Ko-Pah County Park area. While the road is passable, its poor condition prevented frequent visits and reduced the amount of work at higher elevations where pinyon/juniper habitats are present.

In addition, records of the San Diego Natural History Museum and personal fieldnotes were consulted to amplify distributions of all but the commonest species.

Table 1.--Location and Composition of Pitfall Traps in Study Area.

Location	Line Identifier	Elevation	No. Traps	
Davies Valley	Potato Rake	375m	15	
Davies Valley	Easy Pickins	375m	15	
Davies Valley	Lakeside	350m	20	
Davies Valley	Short Cut	320m	2	Note 1
Pinto Wash	North Fork	575m	24	Note 2
Mt. Springs	Sites 1-5	700m	25	
In-Ko-Pah	Ink	970m	26 + 12	Note 3
In-Ko-Pah	County Line	958m	20	
			147	

Note 1: Two five gallon traps were installed with a twenty foot drift fence connecting the two five gallon cans.

Note 2: Four of these traps were connected by two twenty foot drift fences.

Note 3: Twelve specially fabricated traps were installed on vertical rock faces.

RESULTS

Pitfall Traps.--Trapping was an effective means of sampling most lizards and small snakes (Table 2). Some species and the largest individuals of other species were seldom found in traps and either did not enter the traps or were capable of escaping after entering.

Dipsosaurus dorsalis and *Callisaurus draconoides* were commonly seen in the valley floor, washes and alluvial fans of Davies Valley but were rarely found in pitfall traps. *Callisaurus* was most often seen from a slowly moving vehicle, whereas *Cnemidophorus tigris*, *Uta stansburiana* and *Dipsosaurus dorsalis* were more commonly seen when the investigator was on foot. *Uta* and *Cnemidophorus* were the most commonly trapped reptiles but the rarity of *Dipsosaurus dorsalis* and *Callisaurus draconoides* in traps should not be interpreted to indicate that either is rare in the lower study area.

The southwestern corner of Imperial County differs from other areas of the county both in its physiography and ecology. Because of SE to NW orientation of the Sierra Juarez and adjacent Laguna Mountains in southern California, only a small area of southwestern Imperial County includes the desert foothill and eastern scarp of these mountains. Since the remainder of Imperial County is a mosaic of desert floor habitats characteristic of the Colorado Desert, a marked contrast can be seen in faunal and floral occurrences. Only in this area and adjacent areas of San Diego County does the

Table 2.--Results of Pitfall Traps Within Study Area. See Table 1 for Location of Trap Lines.

	County Line	In-Ko-Pah	Rock Droppers	North Fork	Easy Pickins	Potato Rake	Shortcut DF	Lakeside	Mt. Springs
Coleonyx variegatus	X			X		X		X	X
Xantusia henshawi		X	X						
Xantusia vigilis				X					
Callisaurus draconoides						X			X
Crotaphytus insularis	X								
Dipsosaurus dorsalis						X	X	X	
Phrynosoma platyrhinos						X			X
Sauromalus obesus				X		X			X
Sceloporus orcutti	X	X	X						X
Uta stansburiana	X	X	X	X	X	X	X	X	X
Eumeces gilberti	X	X			X				X
Cnemicophorus tigris	X	X		X	X	X	X	X	X
Arizona elegans	X								
Chionactis occipitalis						X	X	X	X
Masticophis flagellum	X						X		
Phyllorhynchus decurtatus				X		X		X	X
Salvadora hexalepis							X	X	
Tantilla planiceps	X				X				
Leptotyphlops humilis					X	X		X	X

elevation and exposure combine to moderate the high temperatures of the Colorado Desert.

Another important element is the expanse of granitic boulders which provide cover, a wide range of microclimates and substrate conditions for a particular reptile community. Associated in the granite boulder habitats are several species known only from extreme southern California and adjacent Baja California.

Among the reptiles and amphibians encountered within the study area are several which are principally distributed in Baja California, Mexico and only the extreme southern areas of California. These are *Petrosaurus mearnsi*, *Urasaurus microscutatus*, *Sceloporus orcutti*, *Phyllodactylus xanti nocticola*, *Xantusia henshawi*, *Crotalus ruber* and *Anarbylus sp*. All of these species have been observed during the study in association with granitic slopes between Davies Valley and the Smuggler's Cove area and do not occur in significant numbers in other areas of Imperial County due to the limited extent of these rock habitats. *Crotaphytus insularis vestigium* is also principally distributed in Baja California but is less restricted in the type of rock outcrops inhabited. Densities of *Sauromalus obesus* and *Xantusia vigilis* are probably higher within the study area than other areas of Imperial County.

Lizards; Davies Valley.--The lizard fauna of Davies Valley is summarized in Table 3. Four species of lizards occur in such dense populations in Davies Valley as to be obvious to the casual visitor.

Table 3.--Lizards from Davies Valley/Pinto Wash Area

RECORDED SPECIES

A 1. *Phyllodactylus xanti nocticola*, Tuberculate Gecko
C 2. *Coleonyx variegatus variegatus*, Western Banded Gecko
A 3. *Anarbylus sp.*, Barefoot Gecko
*B 4. *Callisaurus draconoides*, Zebra-tailed Lizard
A 5. *Crotaphytus insularis vestigium*, Western Collared Lizard
*B 6. *Dipsosaurus dorsalis*, Desert Crested Lizard
B 7. *Gambelia wizlizeni copei*, Leopard Lizard
A 8. *Petrosaurus mearnsi*, Banded Rock Lizard
*C 9. *Phrynosoma platyrhinos calidiarum*, Desert Horned Lizard
A 10. *Sauromalus obesus obesus*, Chuckwalla
*B 11. *Uma notata notata*, Colorado Desert Sand Lizard
C 12. *Uta stansburiana*, Side Blotched Lizard
C 13. *Eumeces gilberti*, Gilbert's Skink
C 14. *Cnemidophorus tigris*, Western Whiptail
B 15. *Xantusia vigilis*, Yucca Night Lizard

POSSIBLE SPECIES

*B 1. *Phrynosoma mccalli*, Flat-tailed Horned Lizard
C 2. *Sceloporus magister*, Desert Spiny Lizard
A 3. *Sceloporus orcutti*, Granite Spiny Lizard
*B 4. *Urasaurus graciosus*, Long-tailed Brush Lizard
A 5. *Xantusia henshawi*, Granit Night Lizard
B 6. *Anniella pulchra*, California Legless Lizard

* Not known or expected from In-Ko-Pah/Smuggler's Cove Area.
A Confined to activity on rocks or in rock regions.
B Confined to activity in sandy washes, alluvial fans or various soils.
C Ubiquitous in distribution within habitats.

These in order of relative abundance are: 1) Uta stansburiana; 2) Cnemidophorus tigris; 3) Callisaurus draconoides; 4) Dipsosaurus dorsalis.

Other species which are common but not encountered in large numbers except under unusual conditions are Petrosaurus mearnsi, Coleonyx variegatus, Phyllodactylus xanti, Crotaphytus insularis, Phrynosoma platyrhinos, and Sauromalus obesus.

Four species were rarely encountered. They were Eumeces gilberti, Xantusia vigilis, Gambelia wizlizeni and Anarbylus sp.. A questionable sighting of Uma notata requires verification.

Sceloporus magister, Phrynosoma mccalli, Anniella pulchra, and Urasaurus graciosus were not observed in the valley but probably occur there in restricted habitats. Sceloporus orcutti, Phrynosoma coronatum, and Xantusia henshawi occur in the upper drainages of Pinto Wash but probably do not enter Davies Valley.

Lizards, In-Ko-Pah/Smuggler's Cove Area.--Table 4 summarizes the lizard fauna of this area. Three lizard species are extremely common at elevations of 800-1100m. that are absent from Davies Valley. These are Urasaurus microscutatus, Sceloporus orcutti, and Xantusia henshawi. All have specific habitat preferences on boulder covered slopes. Phrynosoma also occurs in this area but is absent from lower regions. Eumeces gilberti occupies both areas but was encountered in much greater densities in higher regions.

The New Lizard and Other Geckos.--Three species of geckos are

Table 4.--Lizards from In-Ko-Pah/Smuggler's Cove Area

RECORDED SPECIES

C 1. _Coleonyx variegatus sspp_. (_variegatus_ and _abbotti_, Banded Gecko
A 2. _Crotaphytus insularis vestigium_, Western Collared Lizard
B 3. _Gambelia wizlizeni_, Leopard Lizard
A 4. _Petrosaurus mearnsi_, Banded Rock Lizard
*C 5. _Phrynosoma coronatum_, Coastal Horned Lizard
*A 6. _Sceloporus orcutti_, Spiny Granite Lizard
*A 7. _Urasaurus microscutatus_, Small Scaled Lizard
C 8. _Uta stansburiana_, Side Blotched Lizard
C 9. _Eumeces gilberti_, Gilbert's Snake
C 10. _Cnemidophorus tigris_, Western Whiptail
*A 11. _Xantusia henshawi_, Granit Night Lizard
B 12. _Xantusia vigilis_, Yucca Night Lizard

POSSIBLE SPECIES

*C 1. _Sceloporus occidentalis_, Western Fence Lizard
C 2. _Sceloporus magister_, Desert Spiny Lizard
A 3. _Sauromalus obesus obesus_, Chuckwalla
A 4. _Phyllodactylus xanti nocticola_, Leaf Toed Gecko
B 5. _Anniella pulchra pulchra_, California Legless Lizard
A 6. _Anarbylus sp_., Barefoot Gecko

* Not known or expected from Davies Valley.
A Confined to activity on rocks or extremely rocky regions.
B Confined to activity in sandy washes, alluvial fans or various soils.
C Ubiquitous in distribution within habitats.

known in close sympatry within the Davies Valley area. One of these remains undescribed but is known from three specimens collected in Davies Valley and another specimen collected 60 miles north within Anza-Borrego State Park and a fifth specimen (now lost) from the general area near Borrego Springs. This lizard is assignable to the genus Anarbylus Murphy (1974).

Coleonyx variegatus, the banded gecko, and Phyllodactylus xanti nocticola, the leaf-toed gecko, have been observed and collected in the same general habitat and within 100 yards of the site where one Anarbylus specimen was found. Both Coleonyx and Phyllodactylus are also found at the site in Anza-Borrego Park as well.. Phyllodactylus and apparently Anarbylus are restricted to rocky slopes of the desert foothills and are rarely seen by the casual observer. Like Phyllodactylus, Anarbylus is probably confined to Baja California (to date only known in the vicinity of the U. S./Mexican border and adjacent areas of Imperial, San Diego and Riverside County. In contrast to Phyllodactylus, Anarbylus lacks enlarged digital pads and is probably confined to terrestrial activity and seeks refuge under and between rocks.

Anarbylus differs from Coleonyx in having a single row of slightly enlarged scales on the ventral surface of the digits of the hands and feet and in having enlarged conical scales on the body which are scattered among smaller granular scales. It also has a distinctly banded tail with alternating black and white bands. The black and white bands may be evident only near the base of the tail since all but one specimen known has had a regenerated tail which was light with dark spots.

Three individuals of Anarbylus were found under rocks during the day in September, October and January. A fourth was collected on a road during June 1977. Intensive search during the months of November, December and January failed to produce more individuals. Since March 1977 extensive work has been done with pitfall traps and in a variety of habitats as well as general collecting without further observation of this enigmatic lizard.

It is surprising to discover such an unusual lizard in southern California, an area normally considered to be well known. However, such a discovery is not without precedence with other geckos. Coleonyx reticulatus, a similar lizard, was discovered in 1958 in rocky areas of western Texas, and Anarbylus switaki is still known from a single specimen discovered in central Baja California in 1974. Coleonyx reticulatus is now known from several localities and some of its basic habits are understood.

One factor that may have contributed to the failure to encounter the Anarbylus from San Diego and Imperial Counties is the tendency of amateur collectors and professional zoologists to work near roads or to collect desert animals on roads at night. If our present concept of Anarbylus being restricted to extremely rocky hillsides is correct, it is noteworthy that few roads pass through significant amounts of this type of habitat in San Diego and Imperial Counties. The one exception is I-8 (previously Route 80) and a few narrow rocky regions within Anza-Borrego State Park. For this reason intensive work has been focused on this habitat area.

Additional observations of the new lizard species are needed to determine its relationships with Anarbylus switaki, a terrestrial gecko known on the basis of a single specimen from central Baja California. Also critical is an understanding of its abundance and ecology. This information may tell us how it has escaped notice of the scientific community and whether it is as rare as it appears or whether it is merely restricted in its habitat and activity.

Snakes.--Because of differences in population densities and activity patterns, the snakes in the study area are less accurately known. Table 5 is a compilation based on observations during this study, museum records and known distributions within adjacent areas. Eleven species probably occur throughout the entire study area, but not all have been encountered in all three zones within the study area. This group includes three diurnal species, Salvadora hexalepis, Masticophis lateralis, and Pituophis but most are diurnal or crepuscular. Three snake species, Table 5.--Summary of the Distribution of Snakes in Southwestern Imperial County

	Davies Valley 300-400m	Intermediate Areas 400-800m	In-Ko-Pah 800-1100m
Lichanura trivirgata roseofusca	X	X	X
Masticophis flagellum piceus	X	X	X
Pituophis melanoleucas ssp.	*affinis* ?	*affinis* ?	*annectans* ?
Rhinocheilus lecontei	X	X	X
Arizona elegans ssp.	*eburnata*	*eburnata*	*occidentalis*
Salvadora hexalepis ssp.	*hexalepis*	*hexalepis*	*virgultea* ?
Tantilla planiceps transmontana	X	X	X
Trimorphodon vandenburghi	?	X	?
Leptotyphlops humilis cahuilae	X	X	?
Crotalus mitchelli pyhrrus	?	X	X
Crotalus ruber ruber	X	X	X
Crotalus cerastes laterepens	X	X	absent
Chionactis occipitalis annulata	X	X	absent
Phyllorhynchus decurtata	X	X	absent
Crotalus viridis helleri	absent	X	X
[illegible]asticophis lateralis	abs[illegible]	absent	X

Crotalus cerastes, Chionactis occipitalis and Phyllorhyncus decurtatus are primarily restricted to open desert habitats in Davies Valley and invade intermediate areas as far as Mountain Springs utilizing sandy washes. Masticophus lateralis and Crotalus viridis helleri are inhabitants of higher regions to the west and are found in the region of In-Ko-Pah and the highest parts of Mountain Springs grade.

The combination of coastal and desert species in close proximity results in four species of rattlesnakes within the study area with three species possible at any one site in the area.

The discovery of Tantilla planiceps transmontana in Davies Valley and In-Ko-Pah areas is noteworthy in being a southern range extension of 60 miles from previous localities of a rarely encountered snake. Subsequently a specimen of this subspecies was discovered from Tajo Canyon, 30 miles south of the U. S.-Mexican border evidencing a broader geographic range than expected along the eastern scarp of the Sierra Juarez.

Leptotyphlops humilis is a snake rarely encountered except in pitfall traps. Eight of the nine specimens found (88%) were obtained in trapping periods which included a full moon.

The records noted for Arizona elegans occidentalis and Masticophis lateralis are the firt for Imperial County.

Amphibians.--Due to the arid conditions of this region, amphibians are confined to specific sites where water and temperature conditions are tolerable. The intermitent lake bed in Davies Valley is a potential site of amphibian reproduction. Seeps exposed in the sand floors of Pinto Wash were often found to be enlarged by digging activity by coyotes; these moist basins are potentially critical to survival of canyon and western toads. Canyons along the eastern scarp support populations of *Bufo punctatus* where water seeps over bedrock for most of the year and where pools persist for sufficient periods to allow development of tadpoles. *Bufo boreas* and *Scaphiopus hammondi* are also expected to occur within the study area.

A single specimen of the slender salamander genus *Batrachoseps* was collected under a pinyon pine log near Smuggler's Cove. This individual probably represents a small population of *Batrachoseps major*, but it is outside of the known range of this species. The specimen is currently being studied by Dr. David Wake of the Museum of Vertebrate Zoology, University of California at Berkeley.

Relative Utility of Pitfall Traps in Faunal Surveys.--Because pitfall surveys are often used to survey and monitor populations of small vertebrates, it is desirable to compare relative informational gains resulting from pitfalls in relation to traditional collecting techniques. Comparison of the species captured in pitfalls (Table 2) with the total fauna (Tables 3, 4 and 5) is informative.

Small secretive snakes such as *Chionactis* and *Phyllorhynchus* are often collected on roads at night; they are rarely encountered during standard search tactics but are effectively monitored by pitfall traps. Other small snakes such as *Tantilla* and *Leptotyphlops* are only encountered in significant numbers using pitfall traps. Larger snake species are captured in traps only as juveniles since adults are capable of entering and leaving such traps at will resulting in a potential loss of prey species from the trap in the process.

Terrestrial lizards such as *Uta*, *Coleonyx* and *Cnemidophorus* are easily trapped in greater numbers using pitfalls but others such as *Dipsosaurus* and *Callisaurus* do not enter the traps except rarely. *Crotaphytus*, *Gambelia* and *Sceloporus orcutti* enter the traps but some were observed to jump out and escape during this study. Lizards commonly restricted to rocks such as *Petrosaurus*, *Urasaurus microscutatus* and *Xantusia henshawi* are rarely trapped on the ground. Extremely sedentary species such as *Phrynosoma* and possibly *Sauromalus* are susceptible to repeated trapping and thus only captured as dispersing young or with low informational yield.

Thus it can be concluded that pitfall traps are useful as a supplement to other survey techniques, but would give a distorted view of faunal composition if used exclusively.

Comments on the Herpetofauna of the Study Area in Relation to Management Problems.--Except for small scale mining activity now all but abandoned, and irregular destruction of rock habitats near Mountain Springs by reptile collectors over a fifty year period, major effect on the study area by man is offroad-vehicle use and related activities. The limited sand habitats in Davies Valley show evidence of heavy use by motorcycles, dune buggies and four-wheel drive vehicles. The vegetation on a sandy slope near the main entrance to Davies Valley has much of the original vegetation removed and the denuded area is much enlarged at present in relation to two years ago.

The vehicular use of the Moon Valley/Smuggler's Cove area appears to have increased since the damage to the main road entering the valley by heavy rains in September 1976. A road that once was only popular as a weekend scenic drive is now a greater challenge to offroad vehicles and may have actually increased use of this area. I have observed as many as fifteen vehicles forcing their way up the eroded road in one hour on a Sunday in April of 1977. Damage to vegetation and soils is apparent to anyone who knew the area two years ago.

Offroad vehicle routes penetrate the length of Myers Valley and enter the upper drainages of Pinto Wash and persist despite the elimination of all but motorcycle traffic after the closing of Interstate 8 along Myers Creek.

Such activities pose a potential effect on all reptiles and amphibians occupying open or sandy habitats. Since the distribution of several species is focused in sandy washes, these species are especially vulnerable to injury and habitat degradation by vehicular use.

The entire study area is an extremely scenic part of the Colorado Desert. It is occasionally used as a backpacking and hiking area by organized groups, families and individuals, but daytime use exceeds camping and prolonged use. The potential popularity of this area as a natural hiking area is beyond the scope of this report, but in the opinion of this writer, is limited only by the number of people who have visited the area and realize its natural beauty.

SUMMARY

In relation to other areas of Imperial County, the herpetofauna of the study area is much more diverse. The following reptiles and amphibians do not occur in other areas of Imperial County and are limited to disbributions in extreme southern California and outside of the United States in Baja California. These taxa include: Xantusia henshawi, Urasaurus microscutatus, Petrosaurus mearnsi, Sceloporus orcutti, Phyllodactylus xanti nocticola and Anarbylus sp. Another group of species who have their principal distributions in mountain and coastal California are also limited to southwestern Imperial County: Tantilla einseni *transmontana*, *Masticophis lateralis*, *Phrynosoma coronatum*, *Anniella pulchra*, *Batrachoseps* (?*major*) and *Arizona elegans occidentalis*. Because of habitat quality and diversity several other reptiles occur in significant noteworthy populations within the study area: *Crotaphytus insularis vestigium*, *Xantusia vigilis*, *Sauromalus obesus* and *Leptotyphlops humilis*.

APPENDIX I

Summary of Habitat Types Sampled with Pitfall Traps

Lakeside.--T175;R10E;Sec 19SE;371m. This trapline was located to the north of the dry lakebed on the east side of Davies Valley. The substrate was composed of firm sands interdigitated with fingers of desert pavement on the edge of a volcanic exposure. The vegetation is largely composed of agave, ocotillo, golden chollo, and brittle bush with dense stands of agave the most conspicuous feature. The trapline was approximately 100 meters from a small boulder pile and 500 meters from the eastern valley wall.

Shortcut DF.--T175;R9E;Sec25SE;370m. This trapline and drift fence was due west of Lakeside and approximately 300 meters from the rocky areas froming the western wall of the valley. Soils are decomposed granite forming a firm gravel/sand substrate. Ocotillo, creosote and golden cholla are the most conspicuous plant species in this alluvial fan habitat.

Potato Rake.--T175;R9E;Sec24NW;375m. This trapline was located in the northern area of Davies Valley near the western slopes of the canyon. Soils were loose to firm sands and gravels. This area contains a relatively dense ocotillo forest within 50 meters of boulder-covered slopes.

Easy Pickins.--T175;R9E;Sec24SW;383m. This trapline was in close proximity to the rock slopes forming the western slopes of Davies Valley, approximately due west of the Easy Pickins Mine. All traps were within 1 meter of large boulders in sandy soils. Vegetation was composed of creosote, ocotillo, brittle bush, and burro bush.

North Fork Pinto Canyon.--T175;R9E;Sec26SE;455m. This trapline was accessible only by hiking across the western ridge of Davies Valley. The area is an extensive slope of decomposed granite with some sandy washes transecting gravel soils. Agave clumps are interdigitated with burro bush, ocotillo and cholla.

Mountain Springs.--T175;R9E;Sec20NE;586m. This series of 5 traplines paralleled a stretch of old Highway 80 east of Mt. Springs. Vegetation and soils resembled the North Fork Pinto Canyon but more sandy washes were sampled.

In-Ko-Pah.--T175;R9E;Sec31;958m. These traps were located on the SE slope of the valley across I-8 from In-Ko-Pah County Park. Traps were within two meters of large boulders and rocky slopes. Plants include jojoba, cholla, scrub oak, laurel sumac and numerous annual grasses.

County Line.--T175;R9E;Sec31SW;960m. These traps were arranged in a transect along the San Diego/Imperial County line running from the valley floor up onto the rock slopes of the southeastern slopes of the valley near In-Ko-Pah County Park. Scrub oak, jojoba, golden cholla and buckwheat were conspicuous plants. Soils were composed of sandy clay with scattered rock litter.

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